WHAT IS CLAIMED IS:

1. A method for adaptively controlling network traffic load in a communications network with a shared communications medium comprising:

determining the network traffic load;

calculating network performance metrics based on the network traffic load; and

adjusting the network traffic load based on the network performance metrics.

2. The method of claim 1, wherein the shared communications medium is shared by a plurality of stations, and wherein only stations with traffic to transmit monitor traffic load and calculate network performance metrics and adjust traffic load.

3. The method of claim 1, wherein the network performance metrics are selected from the group consisting of: an amount of time the shared communications medium is in an idle state, an amount of time the shared communications medium is in a collision state, an amount of time the shared communications medium is in a successful transmission state, a

number of frames successfully transmitted, a number of frames unsuccessfully transmitted, and combinations thereof.

4. The method of claim 1, wherein determining the network traffic load comprises monitoring a status of the shared communications medium for every time slot of the shared communications medium.

5. The method of claim 4, wherein determining the network traffic load is performed by a hybrid controller.

6. The method of claim 4, wherein the shared communications medium is shared by a plurality of stations, and wherein determining the network traffic load is performed by each station.

7. The method of claim 1, wherein the adjusting step comprises:

calculating adjustments to network access parameters based on the network performance metrics; and

determining the network access parameters.

8. The method of claim 7, wherein the shared communications medium is shared by a plurality of stations, and wherein the network access parameters are determined by each station.

9. The method of claim 7, wherein the network access parameters are selected from the group consisting of: contention window size, traffic category permission probability, DIFS value, PIFS value, SIFS value, EIFS value, update interval size, update interval threshold, backoff time amount, and combinations thereof.

10. The method of claim 7, wherein the network access parameters are determined by a hybrid controller.

11. The method of claim 11, wherein the shared communications medium is shared by a plurality of stations, and wherein the network access parameters are transmitted to each station in a beacon frame.

12. A method for adaptively controlling network traffic on a communications network with a shared communications medium comprising:

(1) determining traffic category permission probabilities;

(2) calculating an overall permission probability, *PP*;

(3) contending for access to the shared communications medium;

(4) determining updated traffic category permission probabilities; and

(5) repeating steps (2)-(4) until buffered traffic is transmitted.

13. The method of claim 12, wherein determining traffic category permission probabilities comprises a centralized controller assigning the traffic category permission probabilities.

14. The method of claim 12, wherein the shared communications medium is shared by a plurality of stations, and wherein determining traffic category permission probabilities comprises each station assigning the traffic category permission probabilities.

15. The method of claim 12, wherein there are a plurality of traffic categories, and wherein a traffic category permission probability is assigned for each traffic category.

16. The method of claim 15, wherein the calculating an overall permission probability, PP, is a summation of the traffic category permission probabilities assigned to each traffic category.

17. The method of claim 12, wherein the shared communications medium is shared by a plurality of stations, and wherein the calculating overall permission probability step is performed by stations with traffic to transmit.

18. The method of claim 12, wherein the contending for access step comprises:

determining if a contending station is permitted to transmit; and

sending traffic from an appropriate traffic category.

19. The method of claim 18, wherein the determining step comprises:

generating a random number, *X*; and

granting the contending station permission to transmit only if the random number, *X*, is less than or equal to the overall permission probability, *PP*.

20. The method of claim 18, wherein the sending traffic from an appropriate traffic category comprising sending traffic from traffic category *N*, where *N* meets the following criteria:

if $0 < X \leq TCPP_1$, then *N* = 0; else

if $\sum_{i=0}^{M-1} TCPP_i < X \leq \sum_{i=0}^{M} TCPP_i$, then *N* = *M*.

where $TCPP_i$ is the traffic category permission probability for traffic category *i* and is set to zero if traffic category *i* has no traffic to send from the contending station.

21. The method of claim 12, wherein the contending for access step comprises:

setting a backoff timer;

determining if a contending station can transmit; and

sending traffic from an appropriate traffic category.

22. The method of claim 21, wherein the setting a backoff timer comprises:

generating a random number, *X*;

calculating a backoff time based on the random number, *X*; and

setting the backoff timer to the backoff time.

23. The method of claim 22, wherein the calculating a backoff time uses the formula: $J = \lfloor \log(X)/\log(1-PP) \rfloor$, where $\lfloor Y \rfloor$ denotes a largest integer number not exceeding *Y* and *PP* is the overall permission probability.

24. The method of claim 21, wherein the determining step comprises:

freezing a backoff timer when the shared communications medium is busy;

decrementing a backoff timer after the shared communications medium is idle for a point coordinating function inter-frame space period; and

waiting until the backoff timer expires.

25. The method of claim 21, wherein the sending traffic from an appropriate traffic category comprising sending traffic from traffic category *N*, where *N* meets the criteria:

if $0 < C * X \le TCPP_1$, then *N* = 0; else

if $\sum_{i=0}^{M-1} TCPP_i < C * X \le \sum_{i=0}^{M} TCPP_i$, then *N* = *M*.

where $C = \sum_{i=0}^{Z} TCPP_i$, *Z* is a total number of traffic categories, and $TCPP_i$ is

the traffic category transmission probability for traffic category *i* and is set to zero if traffic category *i* has no traffic to send from the contending station.

26. The method of claim 12, wherein the determining updated traffic category permission probabilities step updates the traffic category permission probabilities by an amount that is proportional to how far a ratio of an amount of time the medium is in an idle state to an amount of time the medium is in a collision state is from optimal.

27. The method of claim 12, wherein the determining updated traffic category permission probabilities occurs at regular fixed intervals of time.

28. The method of claim 12, wherein the shared communications medium is shared by a plurality of stations, and wherein the determining traffic category updated traffic category permission probabilities is performed at each station with traffic to transmit.

29. The method of claim 12, wherein the determining updated traffic category permission probabilities is performed at a centralized controller.

30. The method of claim 12, wherein the determining updated traffic category permission probabilities step occurs at irregular time intervals and is triggered by a network performance metric.

31. The method of claim 30, wherein the network performance metric is a ratio of an amount of time the medium is in an idle state to an amount of time the medium is in a collision state is outside of an interval (1 – *epsilon*, 1 + *epsilon*), where *epsilon* is a predetermined value.

32. A centralized controller comprising:

a memory;

a processor coupled to the memory, the processor including circuitry to generate and update traffic category permission probabilities;

a network monitor coupled to a shared communications medium and the processor, the network monitor including circuitry to maintain network performance metrics; and

an update probability signal flag coupled to the processor, the update probability signal flag to notify the processor to update the traffic category permission probabilities.

33. The centralized controller of claim 32, wherein the update probability signal flag is asserted at regular time intervals.

34. The centralized controller of claim 32, wherein the update probability signal flag is asserted when network performance metrics exceed prespecified values.

35. The centralized controller of claim 32, further comprising a transmitter for transmission of the traffic category permission probabilities.

36. The transmitter of claim 35, wherein the transmission of the traffic category permission probabilities occurs following an update of the traffic category permission probabilities.

37. A station comprising:

a memory;

a processor coupled to the memory, the processor containing circuitry to generate and update traffic category permission probabilities;

a medium contention unit, coupled to a shared communications medium and the processor, the medium contention unit contending for access to the shared communications medium, the medium contention unit comprising:

a medium status flag, coupled to the shared communications medium, the medium status flag to denote the status of the shared communications medium;

a station status flag, coupled to the shared communications medium and the processor, the station status flag to denote the state of the station for transmission; and

the station further comprising a transmitter, coupled to the processor and the shared communications medium, the transmitter to transmit information.

38. The communications station of claim 37, wherein the station status flag is asserted when a timer has counted a prespecified number of idle slots.

39. The communications station of claim 37, wherein the station status flag is asserted when a random number generated by the processor is less than or equal to an overall permission probability calculated by the processor.

40. The communications station of claim 37, wherein the medium status flag is asserted when the shared communications medium is sensed by the communications medium to be in an idle state.

41. The communications station of claim 37, wherein the station is permitted to transmit information when both the medium status flag and the station status flag are asserted.

42. The station of claim 37, further comprising:

a network monitor, coupled to the shared communications medium and the processor, the network monitor to calculate network performance metrics; and

a update probability signal flag, coupled to the processor, the update probability signal flag to denote that the traffic category permission probabilities require updating.

43. The communications station of claim 42, wherein the processor updates the traffic category permission probabilities when the update probability signal flag is asserted.

44. The communications station of claim 43, wherein the update probability signal flag is asserted at regular time intervals.

45. The communications station of claim 43, wherein the update probability signal flag is asserted when network performance metrics exceed prespecified values.

46. The communications station of claim 37, further comprising a traffic category permission probability update flag coupled to the processor, the traffic category permission probability update flag to denote that the traffic category permission probabilities have been updated.

47. The communications station of claim 46, wherein the station receives the traffic category permission probabilities from a centralized controller.

48. The communications station of claim 46, wherein the traffic category permission probability update flag is asserted when the station receives an update of the traffic category permission probabilities.

49. The communications station of claim 48, wherein the processor calculates a new overall permission probability when the traffic category permission probability update flag is asserted.

50. A communications network comprising:

a shared communications medium;

at least two stations, coupled to the shared communications medium, each station capable of communicating with the other, each station comprising:

a memory;

a processor coupled to the memory, the processor containing circuitry to generate and update traffic category permission probabilities;

a medium contention unit, coupled to the shared communications medium and the processor, the medium contention unit contending for access to the shared communications medium, the medium contention unit comprising:

a medium status flag, coupled to the shared communications medium, the medium status flag to denote the status of the shared communications medium;

a station status flag, coupled to the shared communications medium and the processor, the station status flag to denote the state of the station for transmission; and

the station further comprising a transmitter, coupled to the processor and the shared communications medium, the transmitter to transmit information.

51. The communications network of claim 50, wherein one of the stations further comprises a centralized controller.

52. The communications network of claim 50, wherein each station specifies and updates its own traffic category permission probabilities.

53. The communications network of claim 50, further comprising a centralized controller.